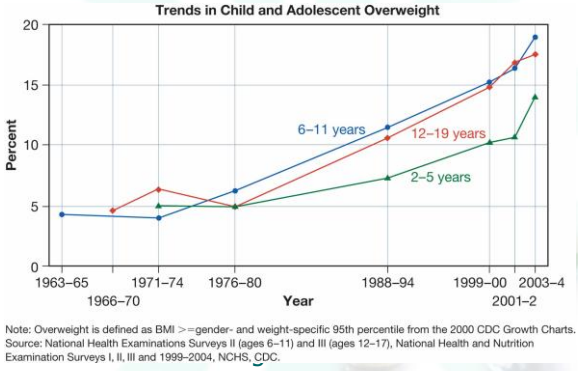
Food Technology's Effect on Portion Size

Jim Painter PhD RD



Percent of Adult Females that are Obese by Country

3.4% Philippines	16% Ireland	25% Russia
5% Switzerland	16% Slovakia	25.1% Mexico
5.6% Thailand	16.4% Peru	25.4% Argentina
6.7% Singapore	17% Austria	26% Oman
8% Malaysia	17% Latvia	26% Czech Republic
8% Tunisia	17% France	28% Greece
8.3% Cuba	17% Lithuania	29.4% S. Africa
9.9% Italy	18% New Zealand	30% Iran
10% Norway	18% Uruguay	31.5% Jamaica
10.3 Brazil	18.5% Australia	34% Bahrain
11% Netherlands	19% Yugoslavia	34% US
12% Sweden	19% Finland	35.7% Paraguay
13% Belgium	20% Germany	36% Curacao
13.7% Canada	20.9% Israel	36% Malta
14% Spain	21% Portugal	36.5 Panama
15% Mauritius	21% Hungary	40% Lebanon
15% Iceland	21% Colombia	40% Trinidid and Tobago
15% Denmark	23% Romania	41% Kuwait
(WHO, 2003)	23% Scotland	43.4% French Polynesia
	23% Chile	66.3% Samoa American
	23.5% England	74.3% Samoa -urban

Percent of Adult Males that are Obese by Country

1.7% Thailand	12% France	21% Lebanon
1.7% Philippines	14% Portugal	21% England
2% Tunisia	14% Belgium	21% Colombia
2.7% Cuba	14.7% Israel	22% Malta
5% Malaysia	14.9% Mexico	22% Czech Republic
5% Mauritius	15% Yugoslavia	22.9% Paraguay
5.3% Singapore	15% Denmark	23% Bahrain
6% Switzerland	15% New Zealand	26.5% Brazil
7.2% Jamaica	15.7% Chile	27.7% U.S.
7.2% Peru	17% Romania	28.4% Argentina
9% Latvia	18% Hungary	29% Greece
9.1% S. Africa	18% Slovakia	32% Kuwait
9.5% Italy	18% Uruguay	34.6% French Polynesia
10% Russia	18% Germany	36.5% Panama
10% Oman	18.5% Australia	56% Samoa –urban*
10% Spain	19% Curacao	64% Samoa –American*
10% Sweden	19% Iceland	
10% Iran	20% Trinidad and Tobago	
11% Lithuania	20% Ireland	
11% Netherlands	20% Scotland	
12% Austria	20% Finland	

Who is to blame?

Is it the food service industry making large portions of unhealthy foods.

Or

Is it the individual making poor food choices?

What has the food industry done to help?

McDonalds

- Happy Meals
  - can order with a side of apple dippers with low-fat caramel instead of fries
  - low-fat milk or fruit juice instead of soda
- Oatmeal- whole grains and a serving of fruit, 290 calories.
- Parfait- 160 calories; 130 mg Ca

Panera

- Order half portions (sandwiches and salads)
- Whole grain bread or an apple for a side
- Chips are baked

Wendy's

- Side items
  - Side salad
  - Baked potato
  - Mandarin oranges

Subway and Dunkin Donuts

- Subway
- Western Egg White & Cheese Muffin Melt
- Calories 160; Fat 4g (sat 1.5g); Protein 15g; Carbohydrate 19g; Fiber 5g; Sodium 680mg

- Dunkin Donuts
- Egg White Turkey Sausage Wake-Up Wrap
- Calories 150; Fat 5g (sat 2.5g); Protein 11g; Carbohydrate 14g; Fiber 1g; Sodium 400mg

Are poor food choices the cause? Why are Americans gaining weight

- I. Lack of exercise
- II. Sedentary lifestyles
- III. Stress/pressure
- IV. Advertising
- V. Genetic
- VI. Deep emotional needs, DR Phil?
- VII. Haven't found the right diet

Premise for today!

- We lose track of how much we are eating (example)

I Portion size

1. Restaurants

Historical glance

Food/Bev	Introduction	Size at intro(oz)	2002 sizes
Budweiser	**1936**	**7.0**	**7,12,22,40**
Hershey bar	**1908**	**0.6**	**1.6,2.6,4.0 7.0,8.0**
BK fry	**1954**	**2.6**	**2.6,4.1,5.7 6.9**
McD burger	**1955**	**1.6**	**1.6,3.2,4.0 8.0**
Soda-BK	**1954**	**12.0, 16.0**	**12.0,16.0, 22.0,32.0 42.0**

Young & Nestle, 2003. JADA Expanding Portion Sizes in the us Marketplace. (231-234)

Then and Now…Bagel

- 20 years ago
- 3 in diameter
- 140 calories

- Today
- 350 calories

Then and Now…Burger

- 20 years ago
- 333 calories

- Today
- 590 calories

- Monster Burger
- 1420 calories

- Web video
- video

Then and now…Fries

- 20 years ago
- 2.4 oz
- 210 calories

- Today
- 6.9 oz
- 610 calories

Then and Now…Spaghetti

- 20 years ago
- 1 C. pasta-sauce w/ 3 meatballs
- 500 calories
- Today
- 2 C. pasta-sauce w/3 meatballs
- 1,025 calories

Value Marketing

- More for less money
  - "Combo Meal"
  - "Value Meal"
- Increases company profits
  - We spend a little extra for larger portions
  - We feel we've gotten a deal
- Is it of value to get more of something you didn't need in the first place

Value Meals

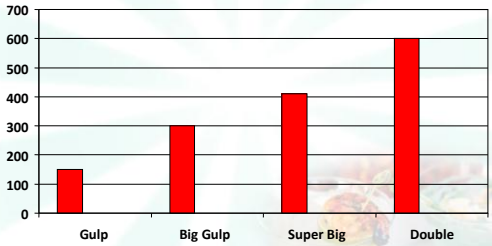
McDonald's Quarter Pounder
- Regular vs. value meal= 660 kcal

Wendy's Double w/cheese
- Regular vs. Combo meal= 600 kcal

Burger King Whopper
- Regular vs. value meal= 590 kcal

1 daily value meal = 1#/wk = 52#/yr = 3,570#

Calorie Comparison-7-Eleven



Other Trends

- Nestle Toll House cookies
  - recipe yields 60 vs. 100 when written in 1949

Super size me

- Portion size me
- Web video

CBS show on portion size me

CBS Morning Show December 2006

video

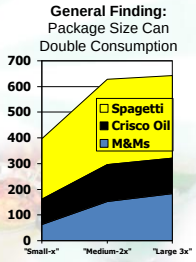
II. Size and Shape of Containers

- General Finding About Package Size . . .

- Study 1. Package Size
- Study 2. Portion Size
- Study 3. Serving Shapes
- Study 4. Shape Study #2

Package Size Increases Consumption

- People who pour from larger containers eat more than those pouring from small
  - Consistent across 47 of 48 categories



Wansink, Brian (1996), NCanPackage Size Accelerate Usage Volume?Ó Journal of Marketing, Vol. 60:3 (July), 1-14.

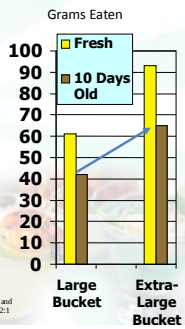
Hungry for Some Popcorn?

- General Question
  - Does portion size effect consumption?
- The Field Study (Chicago, IL)
  - 2x2 Design
    - Large vs. X-Large Popcorn (pre-weighed)
    - Fresh vs. 10-day-old Popcorn

Wansink, Brian and SeaBum Park (2001), NAt the Movies: How External Cues and Perceived Taste Impact Consumption Volume,ÓFood Quality and Preference, 12:1 (January), 69-74.

We Eat Much More from Big Containers

- People eat 45-50% more from extra-large popcorn containers
- They still eat 40-45% more with stale popcorn



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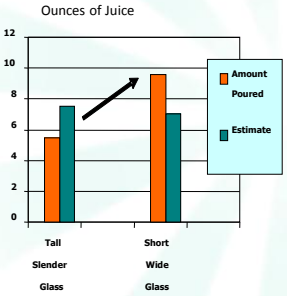
Do Shapes Bias Choice?

- Piaget's Conservation of Volume
  - Kids think tall vessels hold more than wide vessels

- 133 adolescents at a "Nutrition & Fitness Camp" in NH
- Cafeteria at breakfast time
  - Each was randomly given one glass when arriving
  - Tall narrow juice glass or a Short wide juice glass

Yes . . . Container Sizes and Shapes Bias Usage Volume



- Poured 88% more into short wide glasses, but *believed* they poured bout the same
- Hmmm . . . does this still happen with experts and a specific target volume (say 1.5 oz)?

Wansink, Brian and Koert van Ittersum (2003), "Bottoms Up! Peripheral Cues and Consumption Volume," Journal of Consumer Research, December, forthcoming.

Do Peripheral Cues Influence Experts with Precise Target Volumes?

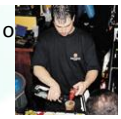
48 Philadelphia bartenders

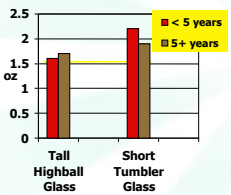
- Given 4 tall, slender (highball) glasses or 4 short, wide (tumbler) glasses
- Given 4 full 1500 ml bottles and asked to pour …
- Split in to . . .
  - Less than 5 years experience
  - More than 5 years experience

Pour gin for gin & tonic
Pour rum for rum & Coke
Pour vodka for vodka tonic
Pour whiskey for whiskey/rocks

Wansink, Brian and Koert van Ittersum (2003), "Bottoms Up! Peripheral Cues and Consumption Volume," Journal of Consumer Research, December, forthcoming.

"When in Philadelphia, Should I Ask for a Tumbler or a Highball Glass?"





- Bartenders poured 28% more alcohol into tumblers than highball glasses
- Experience doesn't eliminate bias

Wansink, Brian and Koert van Ittersum (2003), "Bottoms Up! Peripheral Cues and Consumption Volume," Journal of Consumer Research, December, forthcoming.

III. The effect of visibility and convenience on dietary consumption

Gas stations, remember when someone else pumped the gas
Fast food, remember when you had to go in

RESEARCH QUESTIONS

(1) Do people eat more when food is in sight?

(2) Do people eat more when food is within reach?

METHODS

Intervention:

- Closed candy container containing 30 Hershey kisses replenished daily

Three conditions:

- on top of the desk (visible & convenient)
- in a desk drawer (not visible & convenient)
- away from desk (inconvenient)

METHODS

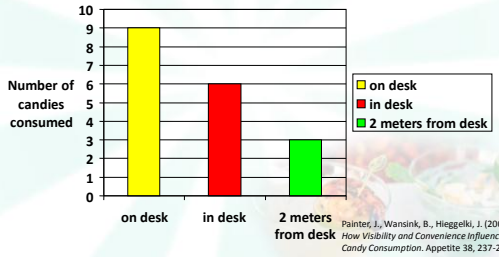
Study design:

- 1 week in each condition
- Length of study: 3 weeks

Questionnaires:

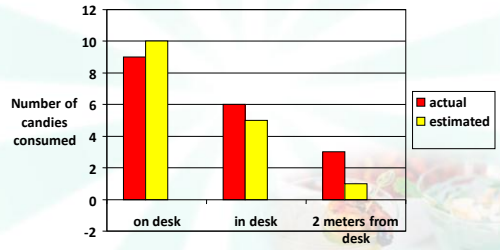
- Estimate of candy consumption in each condition

AMOUNT OF CANDY CONSUMPTION ACCORDING TO CONDITION



Painter, J., Wansink, B., Hieggelki, J. (2002). *How Visibility and Convenience Influence Candy Consumption.* Appetite 38, 237-238.

ACTUAL AND ESTIMATED AMOUNT OF CANDY CONSUMPTION



Painter, J., Wansink, B., Hieggelki, J. (2002). *How Visibility and Convenience Influence Candy Consumption.* Appetite 38, 237-238.

Would this be seen with other types of foods???

METHODS

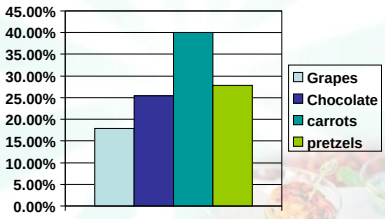
Study design:

- Length of study: 3 weeks
- 2 days in each condition
- 4 foods, grapes, chocolate, carrots & pretzels, were placed in one of 2 conditions

Two conditions:

- On top of the desk (visible & accessible
- In a desk drawer (not visible & inaccessible)

Increase Intake when food is Visible (on desk)



Painter, J., Snyder, J., Rhodes, K., Deisher, C. 2008. *The Effect of Visibility and Accessibility of Food on Dietary Intake.* Journal of the American Dietetic Association, 108, 9. p A93.

METHODS

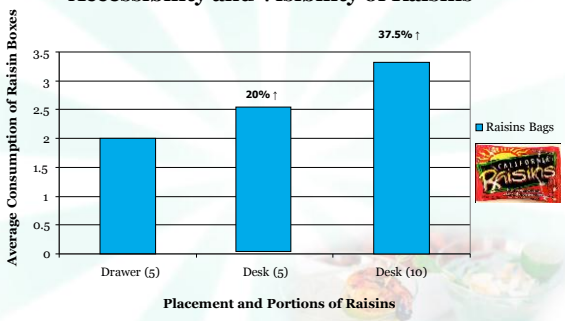
Study design:

- Length of study: 3 weeks
- 3 days in each condition

Three conditions:

- 5 boxes in a desk drawer (not visible & inaccessible)
- 5 boxes on top of the desk (visible & accessible)
- 10 boxes on top of the desk (visible & accessible)

Accessibility and Visibility of Raisins



Gaydosh, B., & Painter, J. (2010). The effect of visibility and quantity of raisins on dietary intake, a pilot study. *Journal of the American Dietetic Association*, *110*(9): A32. DOI: 10.1016/j.jada.2010.06.117.

IV. Can Labels Change the Taste of Foods?

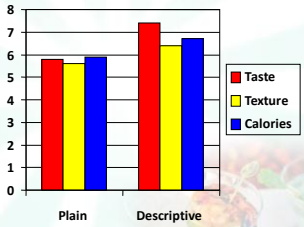
- Study 1. Descriptive Labels in the Cafeteria
- Study 2. Health Labels

Menu Items Used

- Red beans & rice
- Seafood filet
- Grilled chicken
- Chicken Parmesan
- Chocolate Pudding
- Zucchini cookies
- Traditional Cajun Red beans & rice
- Succulent Italian Seafood filet
- Tender Grilled chicken
- Home-style Chicken Parmesan
- Satin Dutch Chocolate Pudding
- Grandma's Zucchini cookies

"Well, I know what I like" --> Maybe Not

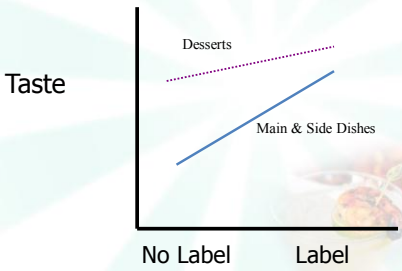
- People evaluate descriptive foods as more favorable



Wansink, Brian, James M. Painter, and Koert van Ittersum, (2001) 'Descriptive Menu Labels'Effect on Sales,'Cornell Hotel and Restaurant Administrative Quarterly, 42:6 (December), 68-72.

Results:

Effects are Less Strong with Desserts

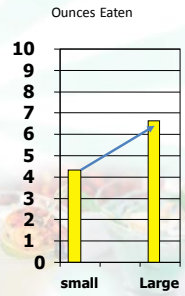


V Visual cues

1. Chicken bones and beer bottles
2. Ice cream
3. Soup
4. Pistachios

Do We Put More into Big Containers

- Subjects were give bowls (17oz or 34oz) and serving spoons of different sizes
- They serves themselves as much as they desired



Wansink, B. Van Ittersum, K. Painter, J. (2006), "Ice Cream Illusions; Bowls, Spoons, and Self Serve Portions" American Journal of Preventive Medicine 31:3, 240-243.

Effect of Bowl and spoon size

CBS Morning Show December 2006

video

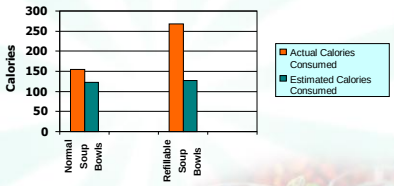
V Visual cues

1. Chicken bones and beer bottles
2. Ice cream
3. Soup

Soup Study

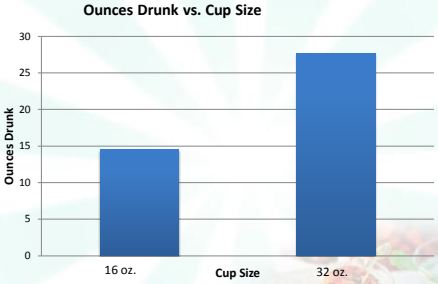
- Fifty-four participants (72% male)
- ½ were give a normal bowl
- ½ were give a refillable bowl
- Details were not provided about the study
- But bowls used in the study were different colors
- Subjects were guessing the purpose of the study.

Refillable Soup Bowls Increase Consumption, but Not Perception of Consumption



Wansink, B., Painter, JE., North, J. 2005. *Bottomless Bowls: Why Visual Cues of Portion Size May Influence Intake.* Obesity Research, 13,1, 93-100.

Cup Size Study



- The group given 16 oz. cups drank an average of 14.45 ounces, while the group given 32 oz. cups drank an average of 27.64 cups. This is a difference of 13.19 ounces.
- There is about 100 calories per 8 oz. lemonade, so those who drank out of 32 ounce cups drank, on average, 164.8 calories more than those who drank out of 16 oz. cups.

Solution

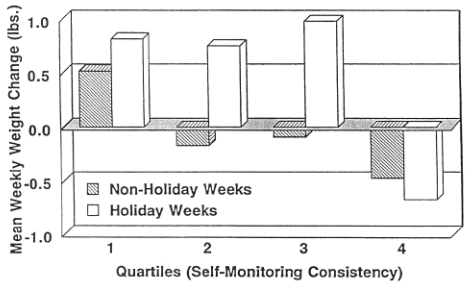
- Self monitoring
  - Know what you are eating
  - Track what you are eating

Efficacy Self monitoring

- 38 subjects
- Sample was split into four quartiles (based on participants' self-monitoring consistency
- During holiday (3 weeks) and non-holiday weeks (7 weeks).

Baker and Kirschenbaum 1998, Health Psych

Efficacy of self monitoring

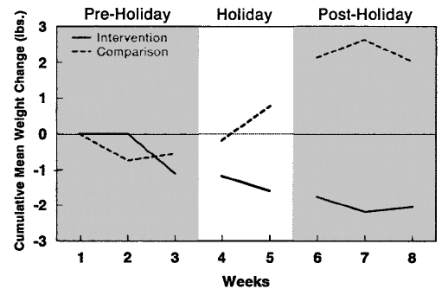


Efficacy Self monitoring

- 57 subjects
- Over the holiday season
- Intervention (adding self-monitoring) 2 weeks pre holiday
- During a 2-week holiday period
- And 2 weeks post holiday.

Boutelle et al. 1999, Health Psych

Efficacy of self monitoring



Conclusion

- The industry must provide healthy options in a variety of portion
- Individuals must make healthy selections in the proper portions through
  - Self monitoring, Selecting proper package size
  - Visibility influences consumption.
  - Inconvenience decreases consumption.
  - Food labels influence consumption.
  - Visual cues to satiation influence consumption

Thank You . . .